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Directional Wave Buoy to Support Low-to-Mid Frequency Ocean Acoustic Studies DURIP Grant

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LONG-TERM GOALS

This DURIP grant was directed towards the preparation for the Targets and Reverberation Experiment that occurred off Florida during the spring of 2013 (TREX13).

Preparation included the procurement of instrumentation to measure the directional wave spectrum which is an important environmental driver to shallow water, mid-to-high frequency sonar performance in particular and underwater acoustic propagation in general.

OBJECTIVES

A primary objective was the purchase of a commercially available, directional wave buoy, with a second objective to use remaining funds for enhancing the capability of the acoustic receiving arrays for use in TREX13.

APPROACH

One Datawell Directional Wave buoy (DWR G4) was purchased, and a second wave buoy was obtained in a loan agreement for use in TREX13. The remaining funds were used to enhance a receiving system used in TREX13 (known as the MORAY, for Moored Receiving Array) and test this system on Lake Washington in February 2013 prior to its deployment in TREX13.

WORK COMPLETED

The Figure 1 shows the DWR G4 wave buoy (left) and the MORAY system as deployed during TREX13 (right).

Report Documentation Page

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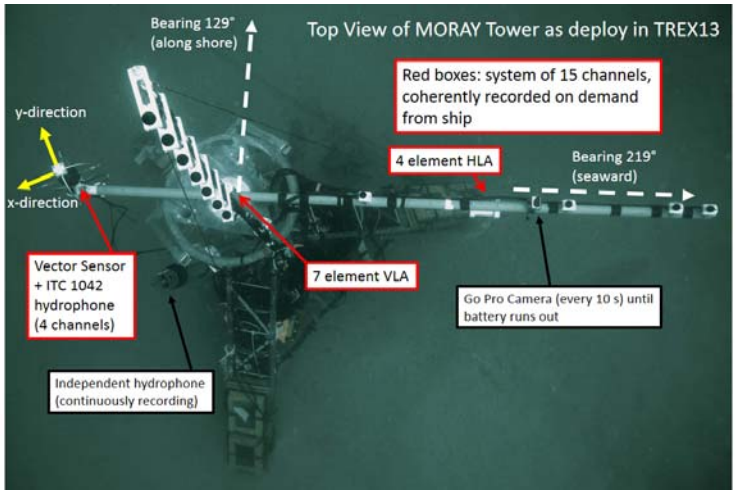

Figure 1. (left) Datawell Directional Wave buoy purchased under this DURIP and used in TREX13. (right) Dive photograph of the MORAY tower made just prior to its recovery from the TREX13 experiment, with its key elements identified.

RESULTS

Directional wave measurements were made using one wave buoy at the TREX13 reverberation source location (near the research vessel R/V *Sharp*) and one buoy located 5 km distant along bearing 129^{o} (near the research vessel R/V *Smith*). A time series (Fig. 2) of the waveheight from these two buoys during a period of simultaneous buoy-operation shows that the wave conditions at these two positions were consistent. Figure 3 shows a corresponding directional wave spectrum for one of the ½ hour averaging periods. A website has been set up to disseminate this wave data (and other environmental data) to TREX13 researchers which will be used in acoustic modeling.

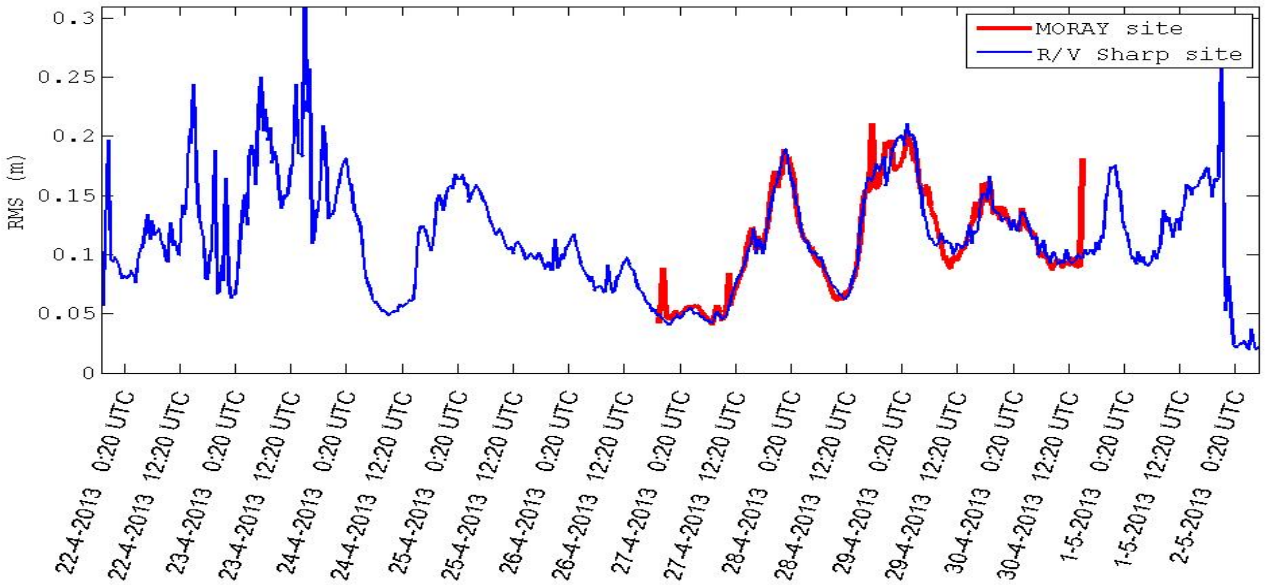

Figure 2. Time series of the RMS waveheight as measured with a directional wave buoy positioned near the R/V Sharp (blue) and near the R/V Smith (red) located approximately 5 km away.

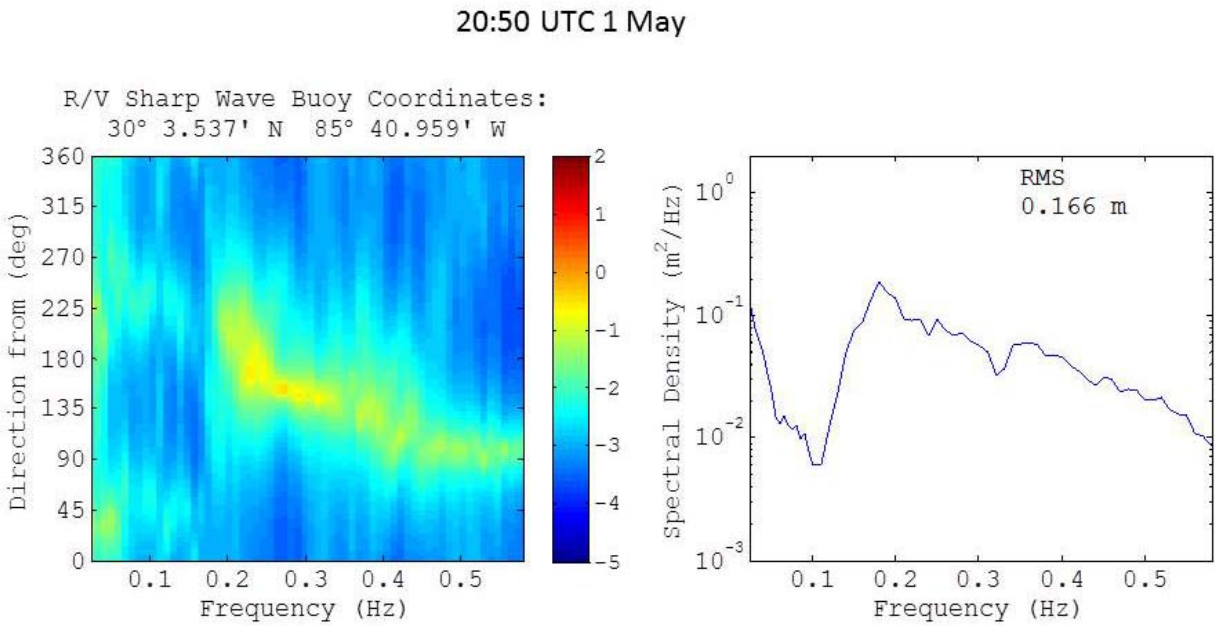

Figure 3. Example of a directional wave spectrum taken from the buoy deployed near the R/V Sharp.

These measurements were recorded on receiving station (known as MORAY) consisting of a combined pressure vector sensor (4 channels), a 7-element vertical line array and a 4-elment horizontal line array of pressure sensors (Fig. 3.); all 15 channels were coherently recorded.

RELATED PROJECTS

The TREX13 experiment was carried out in cooperation with colleagues D.J Tang, Todd Hefner (TREX13 co-chief scientists), and Kevin Williams, all of APL-UW, and William Hodgkiss of SIO-MPL.